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Genetic Tests and Intertemporal Screening in Competitive Insurance Markets

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Genetic Tests and Intertemporal Screening in Competitive Insurance Markets

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Abstract

We consider successive generations of non-altruistic individuals carrying a good or bad gene. Daughters are more likely to carry their mother's gene than the opposite one. Competitive insurers can perform a genetic test revealing an agent's gene. They may condition their quotes on the agent's or on her ancestors' genetic status. In equilibrium generation one is bribed to take the test with an unconditional quote. The insurer uses this information to profitably screen a finite number of generations of their offspring. The offspring of good gene carriers subsidize the tested generation.

Keywords: genetic tests, insurance, screening, pooling.
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1. Introduction

In recent years genetic tests have developed rapidly. These tests enable the prediction of a higher than normal risk of developing specific diseases. For insurers genetic tests constitute new possibilities for more precise risk classification of their clients. These developments have, however, started a debate on whether insurance companies should be allowed to use genetic information to calculate premia according to the applicant's genetic risk: to many people it seems unfair charging individuals identified with a higher than average risk of developing severe diseases substantially higher insurance premia.

Despite this intensive political discussion the theoretical literature to the specific case of genetic testing and health insurance has remained rather limited (Tabarrok (1994), Strohmenger and Wambach (2000), Andersson (2001), Hoel and Iverson (2202), Hoy et al. (2203)). All of these papers consider Rothschild and Stiglitz (1976) type static one-period insurance markets and analyze the effects of genetic testing on the risk categorization of individuals in the spirit of Hoy (1982).

It is, however, obvious that genetic information may also allow intertemporal discrimination. Information about the mothers' genes may allow an insurer to screen their offspring. If the mother carried the good gene, her daughter is less likely to develop a disease than if her mother carried the bad gene. Accordingly, it may be profitable for insurers to quote the offspring of good gene carriers better rates than the offspring of bad gene carriers. The purpose of this paper is to analyze the impact of genetic testing when such intertemporal discrimination is possible.

We consider successive generations of individuals carrying a good or bad gene. Daughters are more likely to inherit their mother's gene than being endowed with the opposite one. The fractions of the good and bad gene carriers are constant through time.

Risk averse individuals must purchase full insurance. They are not altruistic, i.e., they do not care about the well-being of their offspring. At the outset agents do not know which genes they carry. Insurers can, however, perform a test which reveals an agent's genes. Insurers quote prices for the mandatory insurance which may be unconditional or may depend on the agent's or her ancestors' test results. Insurers engage in price competition.

Insurers cannot attract agents with non-loss making quotes conditional on the agents' genetic status. Competition ensures that a fair one-period pooling quote is available under which the individual is fully insured. Prices conditional on the genetic status expose the agent to risk to which she is, however, averse. Accordingly, agents prefer the unconditional pooling contract; see Tabarrok (1994).

Nevertheless, an insurer can exploit the fact that agents are not altruistic. With a multi-period pricing strategy he can induce mothers to take the test and then use this information to profitably screen their offspring.

Our equilibria have the following structure: An insurer bribes the first generation to take the test with an unconditional quote which is below their average probability to fall sick. The insurer then uses this information about generation one to profitably screen their offspring. The offspring of the bad gene carriers get their fair quotes. By contrast, the offspring of the good gene carriers get unfair quotes and the insurer makes a profit on them. Price competition ensures that these profits equal the subsidy given to the first generation so that total profits sum up to zero. Moreover, due to competition the price charged to the offspring of good gene carriers is constant through time and equal to the price charged to generation one. Insurers use the information about generation one to profitably screen a *finite* number of generations of their offspring. When the last offspring generation has been screened, the process starts all over again with testing the next generation.

Comparing these intertemporal screening equilibria to fair unconditional pooling in each period, the tested generation is clearly better off: they pay a price below their average probability of falling sick. The offspring of agents carrying good genes pay a price above their probability of developing the disease; they subsidize the tested generation. Nevertheless, they are still better off than under unconditional pooling. The offspring of mothers with the bad gene are worse off than under unconditional pooling: they pay the price reflecting their higher than average risk of developing the disease. Since the information about a mother's bad gene becomes less precise as one moves up the family tree, daughters of tested mothers pay a higher price than granddaughters and so on.

The paper is organized as follows. The next section introduces the basic model. In section three we introduce the genetic test. As a preliminary step we first consider the scenario where information about the genes of mothers

may only be used to screen daughters. Granddaughters have to be tested anew. In the next subsection we allow the genetic information to be used for any number of generations of the offspring. Section 4 concludes.

2. The Model

We consider successive generations of individuals $D_t,\ t = 1, 2, \ldots$. Generations live for one period. Each member of generation t (mother) has exactly one offspring (daughter) so that the size of all generations is the same. We normalize the size of the generations to 1, i.e., $f(D_t) = 1,\ t = 1, 2, \ldots$.

Each member of generation $t,\ d_t$, can carry an ℓ- or h-gene, i.e., $d_t \in \{\ell, h\}$. If an individual is of type h, the probability of developing a disease is $h \in (0, 1)$; if she is of type ℓ, the probability is $\ell \in (0, h)$, i.e., lower than for the h-types. Denote the members of generation t with the ℓ-gene by ℓ_t and the ones with the h-gene by h_t. Let the fraction of the h-types in generation 1 be $f(h_1) < 1/2$ and the fraction of the ℓ_1's accordingly $f(\ell_1) = 1 - f(h_1)$.

A daughter is more likely to be of type ℓ if her mother is of this type; likewise, she is more likely to be of type h if her mother is so. A daughter can, however, also carry the opposite gene as her mother. Formally, $1 > f(\ell_{t+1}|\ell_t) > f(h_{t+1}|\ell_t) > 0$ which implies $f(\ell_{t+1}|\ell_t) > 1/2$; $1 > f(h_{t+1}|h_t) > f(\ell_{t+1}|h_t) > 0$ so that $f(h_{t+1}|h_t) > 1/2$. Here f is the transition probability of being of a certain type conditional on the type of the mother. These transition probabilities are constant through time.

Let $f(h_{t+1}|\ell_t) = f(\ell_{t+1}|h_t)f(h_t)/f(\ell_t),\ t = 1, 2, \ldots$. Then we have $f(h_{t+1}) = f(h_t) := f(h)$ and $f(\ell_{t+1}) = f(\ell_t) := f(\ell),\ t = 1, 2, \ldots$; that is, the fraction of ℓ- and h-gene carriers are constant through time. Let, for example, $f(\ell) = 3/4$, $f(\ell_{t+1}|\ell_t) = 8/9$, and $f(h_{t+1}|h_t) = 2/3$.

To sum up: We consider generations of size 1 in which the fractions of ℓ- and h-gene carriers are constant through time. The average probability to develop the disease is the same in each generation and equals $\bar{p}(d_t) = f(h)h + f(\ell)\ell := \bar{p}$. Let $h = 1/2$ and $\ell = 1/4$ so that in our example $\bar{p} = 5/16$.

We normalize the cost of treating the disease to 1. Individuals are risk averse which is represented by their utility function $U(\cdot)$ over income with $U' > 0$ and $U'' < 0$.[1] Individuals have initial income $M > 1$. To keep

[1] Our utility function is thus state independent. For an analysis with state contingent

matters simple we assume that insurance is mandatory and equal to the size of the treatment, i.e., individuals must purchase full insurance.[2] Individuals do not know which genes they carry. We further assume that agents are not altruistic, i.e., mothers do not care about the well-being of their offspring.[3]

The mandatory insurance of 1 is provided by $n \geq 2$ insurance companies engaging in Bertrand competition. Insurer $i, i = 1, \ldots, n$, quotes $q_t^i(\cdot)$ for the mandatory insurance in period t. The quotes may be unconditional or they may depend on the result of a genetic test which we describe in the next section. Insurers are risk neutral. They maximize the sum of expected profits over time. For the ease of exposition we set the discount rate to zero. Due to price competition equilibrium profits will be zero.

Without the genetic test neither the first generation's insured know which genes they carry nor do insurers, implying that any discrimination among agents of generation 1 is impossible. From the second generation on insurers could try to condition their quotes on the illness history of an agent's ancestors. To focus on the role of genetic tests, we rule out this possibility. Therefore, without the genetic test insurers can offer only unconditional quotes in each period. Each insurer i will offer each period an unconditional quote q_t^i for the mandatory insurance of 1. Bertrand competition drives profits down to zero so that in equilibrium $q_t^i = \bar{p}, t = 1, 2, \ldots,\ i = 1, \ldots, n$.

3. Genetic Test

Now assume a genetic test becomes available that reveals an individual's genes. We consider the case where only insurance companies can perform the test.[4] Let the test be costless. If an agent is tested, the insurer can condition his quote on her genetic status. Moreover, the quotes for the individual's descendants can also depend on the agent's test result.

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utility functions see Strohmenger and Wambach (2000).

[2]Note that our mandatory insurance differs from the compulsory insurance in Hoel and Iversen (2002). There all agents pay the same price but the insurance may be less than complete. In our set-up insurance is full, yet prices may depend on individual risk.

[3]For our results to hold it is sufficient that mothers care less about their daughters' well-being than their own.

[4]If the agents can take the test, the test results will also become known to the insurers. If the test shows the ℓ-gene, an agent will happily release this information to the insurer. If the test result is h, the information will be kept secret. Accordingly, those individuals who do not reveal their test are potentially high risk. See Tabarrok (1994).

Suppose an insurer tries to attract individuals with prices $q_t(\ell_t) < \bar{p} < q_t(h_t)$ conditional on the test outcome. If the agent carries the ℓ-gene, she gets a better quote than if she carries the h-gene. Suppose further the prices do not yield losses, i.e., $f(h)q_t(h_t) + f(\ell)q_t(\ell_t) \geq \bar{p}$. Then no agent will accept this offer as long as pooling is available. With the fair pooling quote the individual's utility is $U(M - \bar{p})$: the agent is fully insured and bears no risk at all. With conditional prices the expected utility amounts to $f(\ell)U(M - q_t(\ell_t)) + f(h)U(M - q_t(h_t))$: the agent is fully insured but bears the price risk generated by the genetic test. Jensen's inequality together with the fact that the conditional prices do not yield losses imply that the agents are better off with the fair pooling quote $\bar{p}$. Conditional pricing introduces risk to which the agents are averse; see Tabarrok (1994).

Given that a one-period pricing strategy conditional on the test results does not work out, an insurer can try to exploit the fact that agents are not altruistic. With a multi-period pricing strategy he can try to induce mothers to take the test and then use this information to profitably screen their offspring.

To induce agents of generation t to take the test, the insurer must offer them terms generating at least the expected utility of $\bar{p}$. Since agents are risk averse and insurers risk neutral, the best way to achieve this is by requiring to take the test and then quoting $q_t \leq \bar{p}$ which is not conditional on the test outcome (we suppress the index for the insurer wherever possible). For the agents' daughters the insurer then quotes $\mathbf{q}_{t+1} = (q_{t+1}(\ell_t), q_{t+1}(h_t))$, for their granddaughters $\mathbf{q}_{t+2} = (q_{t+2}(\ell_t), q_{t+2}(h_t))$, and so on.

3.1 Two-period Pricing Strategy

To fix ideas, suppose insurer 1 induces generation 1 to take the test and then uses the genetic information about mothers to make a profit on their daughters. The insurer may not use the information about mothers to screen granddaughters. He has to start the process again with testing granddaughters. We consider at the moment only such two-period pricing strategies together with with the one-period pricing strategy, i.e., unconditional pooling. We will give up this assumption in the next section.

In equilibrium the market shares of insurers are undetermined. They may share the market equally, or market shares may be asymmetric. To save on

notation for market shares, in the following argument we look at the case where insurer 1 serves the whole market as he may well do in equilibrium.

Suppressing the insurer index company one offers quotes q_1 and $\mathbf{q}_2 = (q_2(\ell_1), q_2(h_1))$. Here $q_2(\ell_1)$ $[q_2(h_1)]$ is the quote for daughters whose mothers were of type ℓ $[h]$. With this two-period pricing strategy, his profits amount to $\pi_1 = q_1 - \bar{p}$ and $\pi_2 = [q_2(\ell_1) - p(d_2|\ell_1)]f(\ell) + [q_2(h_1) - p(d_2|h_1)]f(h)$. There are $f(\ell)$ $[f(h)]$ daughters whose mothers had the ℓ- $[h]$-gene. The insurer's profits on the first group is the quote $q_2(\ell_1)$ minus the expected probability of developing the disease conditional on the mothers' ℓ-genes, and, likewise, for the second group. In our example $p(d_2|\ell_1) = 5/18$ and $p(d_2|h_1) = 5/12$.

Let us first consider the quote $q_2(h_1)$ the insurer charges daughters whose mothers were of type h. This price is obviously restricted by what the competition offers in period 2. This in turn depends on whether the competitors can attract the entire generation or only those agents with type h-mothers.

Suppose the quote $q_2(\ell_1)$ is such that the agents with type ℓ-mothers continue buying from firm 1. If $q_2(h_1) > p(d_2|h_1)$, another firm can undercut insurer 1 and make a positive profit on this group. Insurer 1 will not charge $q_2(h_1) < p(d_2|h_1)$ because this reduces his period two profit. Accordingly, $q_2(h_1) \geq p(d_2|h_1)$. If the equality holds, the insurer serves this group while making zero profits; if the inequality is strict, he loses this group and also makes zero profits. We assume that he quotes $q_2(h_1) = p(d_2|h_1)$ and serves this group.

The insurer can, therefore, only make a profit on agents with type ℓ-mothers. This profit is, however, restricted. First note that $q_2(\ell_1) \leq \bar{p}$. If this were not the case, another firm, say company 2, could enter the market with an unconditional quote $q_2^2 \in (\bar{p}, q_2(\ell_1))$. He attracts the whole generation 2 and makes a profit because his quote is above the average probability of falling sick.

Yet $q_2(\ell_1)$ is further restricted by q_1. To see this, suppose insurer 1 makes zero profits with his two-period pricing strategy $(q_1, \mathbf{q}_2)$, i.e., $\pi_1 + \pi_2 = 0$. Now let $q_2(\ell_1) > q_1$. Then insurer 2 can enter the market with a two-period pricing strategy $(q_2^2, \mathbf{q}_3^2)$. With his price $q_2^2 \in (q_1, q_2(\ell_1))$ he attracts both groups who happily take the test. In period 3 he charges $q_3^2(\ell_2) < q_2(\ell_1)$. If q_2^2, $q_3^2(\ell_2)$ are appropriately chosen, insurer 2 makes positive profits with this two-period pricing strategy. Consequently, $q_2(\ell_1) = q_1$ and Bertrand competition ensures that $(q_1, \mathbf{q}_2)$ generate overall zero profits. Formally, $\pi_1 =$

$q_1 - \bar{p}$, $\pi_2 = [q_1 - p(d_2|\ell_1)]f(l)$, and $\pi_1 + \pi_2 = 0$. Solving for q_1 yields

$$q_1 = \frac{\bar{p} + f(\ell)p(d_2|\ell_1)}{1 + f(\ell)}. \tag{1}$$

To summarize our findings:

Proposition 1: *Suppose firms are restricted to one- and two-period pricing strategies. Then there exists an equilibrium where firm 1 charges generation 1* q_1^1 *as defined by* (1) *and generation 2* $q_2^1(\ell_1) = q_1^1$, $q_2^1(h_1) = p(d_2|h_1)$. *The process starts all over again with generations* $3, 5, \ldots$. *Firm 1 serves the entire market and the other firms are inactive.*

In each odd period, say period 1, firm 1 induces all agents to take the test at a quote q_1 below the average probability to fall sick $\bar{p}$. In our example $q_1 = 75/252 < 5/16 = \bar{p}$ and $\pi_1 = -15/1008$. In each even period the insurer recoups his investment with the daughters whose mothers had the ℓ-gene, $p(d_2|\ell_1) < q_2(\ell_1) = q_1$. In our example $p(d_2|\ell_1) = 5/18$ and $\pi_2 = 15/1008$.

Let us use the example to show that in equilibrium indeed $q_2(\ell_1) = q_1$. Suppose on the contrary that insurer 1 charges, e.g., $q_1 = 291/1008 < 75/252$ and $q_2 = 78/252$. With these prices $\pi_1 + \pi_2 = 0$. Yet now insurer 2 can enter with, say, $q_2^2 = 76/252$ and $\mathbf{q}_3^2 = (75/252; 5/12)$. He attracts both groups in period 2 and everybody takes the test. His profits in period 3 on daughters of ℓ-mothers outweigh his losses from period 2.

Note that this equilibrium is not unique. To save on notation for the market shares, we look at the case where firm 1 serves the entire market and the other firms are inactive. It is of course possible that, e.g., all firms quote the equilibrium prices and share the market equally.

Let us compare this two-period pricing equilibrium with the one-period one where firms charge $\bar{p}$ in each period. The tested generations are clearly better off because they pay a price below their average probability of falling sick. By paying a price q_1 above their probability of falling ill $p(d_2|\ell_1)$, daughters of type ℓ-mothers cross-subsidize the entire preceding generation. Yet they are still better off than under one-period pooling. By contrast, daughters of type h-mothers are worse off than in the one-period pooling equilibrium. To summarize: In the two-period pricing equilibrium the tested generations and their offspring with type ℓ-mothers gain at the expense of their descendants with type h-mothers.

3.2. Arbitrary Pricing Strategies

We have seen that the two-period pricing strategy drives out the one-period one. The next question to ask is whether insurer 1 should use his informational advantage about generation 1 also for generations $3, 4, \ldots$. To answer this question we allow now for arbitrary pricing policies.[5]

As a first step we define k-period pricing policies starting from generation 1 on. Under such a policy generation 1 is tested and their genetic information is then used on $(k-1)$ generations of their offspring. More specifically, we define *k-period pricing* as follows:

For $k = 2, 3, \ldots$ the quotes $q_{1,k},\ \mathbf{q}_{t,k} = (q_{1,k}, p(d_t|h_1))$, give rise to profits $\pi_1 = \bar{p} - q_{1,k}$ and $\pi_t = [q_{1,k} - p(d_t|\ell_1)]f(\ell),\ t = 2, \ldots, k$. The zero profit condition $\sum_{t=1}^{k} \pi_t = 0$ then gives us

$$q_{1,k} = \frac{\bar{p} + f(\ell) \sum_{t=2}^{k} p(d_t|\ell_1)}{1 + (k-1)f(\ell)}. \tag{2}$$

To complete the definition let $q_{1,1} = \bar{p}$; with one-period pricing only unconditional pooling is possible.

We have defined k-period pricing rather narrowly. We have already taken into account that k-period pricing must lead to zero profits. Moreover, we have determined $q_{1,k}$ such that it is an equilibrium if only one-period and k-period pricing are allowed for. A firm offering $q_{1,k}$ as defined by (2) cannot be driven out of the market by the one-period pooling price $q_{1,1} = \bar{p}$. We have $q_{1,k} < \bar{p}$ because $p(d_k|\ell_1) < \bar{p}$ for all $k = 2, 3, \ldots$.

It is, however, unclear which k-period pricing policy firms will follow. If, e.g., $q_{1,3} > q_{1,4}$, a firm with the 3-period pricing policy will be driven out of the market by a firm using the 4-period one. In a second step we analyze, therefore, the prices $q_{1,k},\ k = 1, 2 \ldots$ in detail. It turns out that these prices are U-shaped in k.

Proposition 2: *The set of quotes $\{q_{1,k}\},\ k = 1, 2, \ldots$, defined by (2) is U-shaped in k and attains its minimum at some finite $\kappa \geq 2$.*

[5] We assume that, say, an agent of generation 3 does not know her mother's quote. Otherwise, she could use her mother's low rate to convince another insurer that her grandmother must have been of type ℓ.

Proof: Straightforward computations show that $q_{1,1} = \bar{p} > q_{1,2}$. Next note that

$$q_{1,k} < (\geq)\ q_{1,k+1} \quad \Leftrightarrow$$

$$\bar{p} - p(d_{k+1}|\ell_1) < (\geq)\ f(\ell)[(k-1)p(d_{k+1}|\ell_1) - \sum_{t=2}^{k} p(d_t|\ell_1)], \quad k = 2, 3, \ldots.$$

The LHS is positive and monotonically decreasing in k with $\lim_{k\to\infty} \text{LHS} = 0$. The RHS is positive and increasing in k. Consequently, either $\kappa = 2$ or it is defined by the k where the strict inequality first holds. $q_{1,k}$ is decreasing in k for $k < \kappa$ and increasing for $k > \kappa$.

Q.E.D.

Proposition 2 states that a κ-period pricing strategy leads to the lowest price $q_{1,k}$ that can be charged to the tested generation 1 and all $(k-1)$ descendant generations of the ℓ_1-types. In our example $\kappa = 3$. We have $\bar{p} = 5/16,\ p(d_2|\ell_1) = 5/18,\ p(d_3|\ell_1) = 95/324,\ p(d_4|\ell_1) = 220/729,\ q_{1,1} = 5/16,\ q_{1,2} = 75/252,\ q_{1,3} = 8/27$, and $q_{1,4} = 2820/9427 > q_{1,3}$.

Increasing the pricing strategy from k to $k+1$ increases profits by $\pi_{k+1} = (q_{1,k+1} - p(d_{k+1}|\ell_1))f(\ell)$. If $\pi_{k+1} > 0$, the profits made on the descendants of types ℓ_1 increases. Hence, $q_{1,k+1} < q_{1,k}$. The tested generation gets a larger cross-subsidy so that total profits sum up to zero.

Conversely, if $\pi_{k+1} < 0$, $q_{1,k+1} > q_{1,k}$. The profits made on the offspring of types ℓ_1 decreases and so does the subsidy for the tested generation. Straightforward computations show that $\pi_{k+1} < 0$ is equivalent to $q_{1,k} < p(d_{k+1}|\ell_1)$. If the price $q_{1,k}$ charged under k-period pricing is lower than the conditional probability of falling ill of generation $k+1$, adding this cohort lowers the profits made on the descendants of types ℓ_1's. The existence of such a critical cohort is ensured because $p(d_{k+1}|\ell_1)$ converges to $\bar{p}$ as k becomes large.

To put it differently: The informational advantage of having tested generation 1 dilutes with successive generations: $p(d_{k+1}|\ell_1)$ increases with k and converges to $\bar{p}$. Adding additional generations to the pricing strategy becomes less and less attractive as one moves up the family tree.

As long as it is profitable to add a generation to the pricing policy, the price q_1 falls. If the additional generation adds to profits made on the offspring of the tested generation 1, the price q_1 has to fall so that overall profits sum up to zero. Yet, there is some generation $(\kappa+1)$ where $p(d_{\kappa+1}|\ell_1)$ exceeds

the price $q_{1,\kappa}$ charged under the κ-period pricing policy. Adding this generation to the pricing policy lowers profits made on the offspring and actually increases q_1. This reasoning is similar to the well-known textbook result that average costs are decreasing as long as they are higher than marginal costs and increasing when the are smaller than marginal costs.

It is now clear how an equilibrium looks like:

Proposition 3: *There exists an equilibrium where firm 1 follows a κ-period pricing policy with κ defined by Proposition 2. It charges the first generation $q^1_{1,\kappa}$ as defined by* (2) *and its offsprings $q^1_{t,\kappa}(\ell_1) = q^1_{1,\kappa}$, $q^1_{t,\kappa}(h_1) = p(d_t|h_1)$, $t = 2, \ldots, \kappa$. The procedure starts all over again with generations $\kappa{+}1, 2\kappa{+}1, \ldots$. Firm 1 serves the entire market and the other firms are inactive.*

If firm 1 charges $q_{1,\kappa}$, it can not be driven out of the market by another pricing policy because they all command higher prices. Let us compare the κ-period pricing equilibrium to the one-period pooling equilibrium $q_{1,1} = \bar{p}$. The advantage of the tested generation 1 and the descendants of the types ℓ_1 is greatest because $q_{1,\kappa}$ is minimal. Bertrand competition ensures that the surplus of these groups is maximized.

What about the offspring of the types h_1? They are worse off than under under pooling because $p(d_t|h_1) > \bar{p},\ t = 2, 3, \ldots$. Note that $p(d_t|h_1)$ is decreasing in t. Generation $(t{+}1)$ gets a lower quote than generation t because the information about them from their ancestor is less precise. Accordingly, daughters of tested h-mothers suffer more than granddaughters and so on if genetic tests become available.

4. Conclusions

The purpose of this paper is to analyze intertemporal screening through genetic tests. We show that generation one is bribed to take the test with an unconditional quote. The insurer then uses this information to profitably screen a finite number of generations of their offspring. The offspring of good gene carriers subsidize the tested generation. Yet they are still better off than under unconditional pooling. The offspring of bad gene carriers lose compared to pooling because they have to pay a price reflecting their higher than average risk of developing the disease.

In this paper we abstract from many important aspects of genetic tests in health insurance markets. We assume that only the insurer can take the test and that the test results are not observable by any other party. The testing insurance company thus has a monopoly for the information. Agents cannot take the test themselves so that we do not run into the problems of strategic revelation of the results. Moreover, the assumption of compulsory complete insurance rules out further screening possibilities of the insurers.

The assumption that agents are non-altruistic is, by contrast, not critical; all we need is that they care more about their own than the well-being of their offspring. The cost of the test may also be positive. As long as the test cost is below the profits made on the screened generations, our results still hold qualitatively. Only when the test cost is above these profits, intertemporal screening does not pay.

We hope that despite these simplifying assumptions we shed some light on how intertemporal screening with genetic tests might work. In particular, we are able to identify the winners and the losers compared to the unconditional pooling situation. This might be helpful in the ongoing political discussion about the pro and cons of allowing genetic tests for health insurance.

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